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Listing of Claims

The following listing of claims will replace all prior versions, and listings, of claims in the subject application:

1. (original) A surface-emission laser diode, characterized by:

a semiconductor substrate;

a cavity region formed over said semiconductor substrate, said cavity region comprising: an active layer structural part including at least one quantum well active layer producing a laser light and a barrier layer; and a spacer layer provided in a vicinity of said active layer structural part, said spacer layer comprising at least one material; and

an upper reflector and a lower reflector provided over said semiconductor substrate respectively at a top part and a bottom part of said cavity region,

said cavity region, said upper reflector and said lower reflector forming a mesa structure over said semiconductor substrate,

said upper reflector and said lower reflector constituting a semiconductor distributed Bragg reflector having a periodic change of refractive index and reflecting an incident light by interference of optical waves,

at least a part of said semiconductor distributed Bragg reflector being formed of a layer of small refractive index of $\text{Al}_x\text{Ga}_{1-x}\text{As}$ ($0 < x \leq 1$) and a layer of large refractive index of $\text{Al}_y\text{Ga}_{1-y}\text{As}$ ($0 \leq y < x \leq 1$),

said lower reflector being formed of a first lower reflector having a low-refractive index layer of AlAs and a second lower reflector formed on said first lower reflector, said second lower reflector having a low-refractive index layer of AlGaAs ,

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wherein any one layer constituting said cavity region contains In.

2. (original) The surface-emission laser diode as claimed in claim 1, characterized in that at least a lower spacer layer and an upper spacer layer contains In.

3. (original) The surface-emission laser diode as claimed in claim 1, characterized in that, in said second lower reflector, said low refractive index layer and said high refractive index layer are repeated by 10 pairs or less.

4. (original) The surface-emission laser diode as claimed in claim 1, characterized in that a part of said spacer layer comprises $(\text{Al}_a\text{Ga}_{1-a})_b\text{In}_{1-b}\text{P}$ ($0 < a \leq 1$, $0 \leq b \leq 1$), said quantum well active layer comprises $\text{Ga}_c\text{In}_{1-c}\text{P}_d\text{As}_{1-d}$ ($0 \leq c \leq 1$, $0 \leq d \leq 1$), and said barrier layer comprises $\text{Ga}_e\text{In}_{1-e}\text{P}_f\text{As}_{1-f}$ ($0 \leq e \leq 1$, $0 \leq f \leq 1$).

5. (original) The surface-emission laser diode as claimed in claim 4, characterized in that said quantum well active layer has a compressive strain.

6. (original) The surface-emission laser diode as claimed in claim 5, characterized in that said barrier layer has a tensile strain.

7. (original) The surface-emission laser diode as claimed in claim 4, characterized in that said semiconductor substrate comprises a (100) GaAs substrate having a surface orientation inclined in a direction of a (111)A surface with an angle in a range of 5° to 20° .

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8. (original) The surface-emission laser diode as claimed in claim 4, characterized in that said surface-emission laser diode has an oscillation wavelength of about 680nm or longer.

9. (original) The surface-emission laser diode as claimed in claim 5, characterized in that said semiconductor substrate comprises a (100) GaAs substrate having a surface orientation inclined in a direction of a (111)A surface by an angle in a range of 5° to 20°.

10. (original) The surface-emission laser diode as claimed in claim 5, characterized in that said surface-emission laser diode has an oscillation wavelength of about 680nm or longer.

Claims 11-35 (canceled).